

U.S. Department
of Transportation



United States
Coast Guard

Commandant (G-NIO)
United States Coast Guard

MAILING ADDRESS:
Washington, D.C.
20593-0001
(202) 267-1450

COMMANDANT INSTRUCTION 3142.1

COMDTINST 3142.1

29 DEC 1988

Subj: Bathythermograph Program

- Ref: (a) COMDTINST M3161.10, Manual for Marine Science Operations.
(b) SIPPICAN Manual R-603C Series: Instruction Manual for the Expendable Bathythermograph System (NOTAL).
(c) COMDTINST M5500.11 Series; Coast Guard Security Manual.
(d) NAVOCEANCOMINST 3140.1H; U.S. Navy Oceanographic and Meteorological Support System Manual (FOUO)(NOTAL)

1. PURPOSE. This instruction describes the program for the collection and reporting of bathythermograph observations.
2. DIRECTIVES AFFECTED. COMDTINST 3161.1F is canceled.
3. OBJECTIVE. The U.S. Coast Guard cooperates with the U.S. Navy in its bathythermograph (BT) program. BT information is used by the Navy for thermal structure forecasting to support submarine and antisubmarine operations. In addition, ocean temperature distributions of daily, seasonal and yearly scales provide vital information to the National Weather Service (NWS). The Expendable Bathythermograph (XBT) is presently the best single system for measuring temperature distribution. This equipment provides a continuous record of the temperature of ocean water as a function of depth and can be employed while a vessel is underway, minimizing interference with other missions. Reference (a) contains Coast Guard operational procedures for the XBT; reference (b) provides a technical description of the instrument operation and maintenance.
4. BACKGROUND. Commander, Naval Oceanography Command, through the Fleet Numerical Oceanography Center, collects oceanographic data required for the environmental analysis and forecasts used in fleet operations.

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	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z		
A	2	2		2	2																							
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4. (cont'd) The National Weather Service uses oceanographic temperature data for their Gulf Stream analysis program. These programs rely on real time XBT data as well as detailed analysis of the original data and logs. On occasion Headquarters, area or district commanders may authorize special XBT surveys. In such cases the requesting authority will be responsible for purchasing XBT probes or reimbursing the cutter for XBT probes used for the special project.
5. OBSERVATIONS. Subject to availability of probes all XBT equipped Coast Guard cutters shall make bathythermograph observations every six hours while underway in water depths exceeding 100 fathoms, and may occasionally be directed to make observations in water depths less than 100 fathoms for special projects. Observations to the maximum depth obtainable shall be made four times daily at 0000, 0600, 1200, and 1800Z using the T-4 (450 meter) XBT probe. Modification to the routine schedule of observations may be necessary from time to time. Deviation from the schedule can be authorized by Commanding Officer, Fleet Numerical Oceanography Center. Deviations shall be reported to Commandant (G-NIO) and Commander International Ice Patrol. Should operational commitments of higher priority conflict with required XBT observations, casts should be taken as close as possible to the scheduled times.
6. REPORTS:
 - a. Bathythermograph observations shall be encoded for radio transmission in the JJXX format indicated on the Bathythermograph Log Sheet (NOAA Form 77-22). This format is required for efficient automated processing and analysis, and all older formats are obsolete and shall not be used. The log sheet pad contains detailed instructions and coding information.
 - b. XBT data shall be transmitted by PRIORITY precedence to the appropriate AIG (for both unclassified and classified messages):
 - (1) AIG 7608: For BATHY observations in the NORTH PACIFIC, SOUTH PACIFIC and INDIAN OCEANS and their associated seas and basins; all areas SOUTH of 60 degrees SOUTH LATITUDE.

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6. b. (2) AIG 7641: For BATHY observations in the NORTH and SOUTH ATLANTIC OCEANS; GULF OF MEXICO; NORTH, NORWEGIAN, BALTIC, RED, MEDITERRANEAN and CARIBBEAN SEAS; the GREAT LAKES; all areas NORTH of 60 degrees NORTH LATITUDE.
7. LOGS. CNOc 3167/2//NOAA Form 77-22 BATHYTHERMOGRAPH LOG, is the prescribed permanent XBT record. The forms are in pads of fifty sheets with a fold out cover containing preparation, mailing and ordering instructions. Bathytethermograph logs shall be finalized at the end of each calendar month or at the end of a cruise, whichever occurs first and submitted with the uncut XBT traces to the National Oceanographic Data Center (NODC), Washington, DC 20235. When specialized oceanographic cruises are being conducted at Headquarters, area, or district direction, logs and analog trace sheets shall be disposed of as directed by the requesting Coast Guard command. The recipient is responsible for applying acceptable quality control procedures to the data before forwarding to NODC. Enclosure (1) is a reproduction of the log instructions which includes a sample filled-out log form CNOc 3137/2//NOAA Form 77-22.
8. CLASSIFICATION OF XBT OBSERVATIONS AND MESSAGES. During certain classified operations, release of oceanographic information may reveal involvement with classified missions or give a classified position. In such cases, data (messages and logs) shall be assigned the appropriate classification. Additionally, such XBT data shall be safeguarded according to procedures outlined in reference (c). Facilities for handling classified XBT data are not available at the NODC. Therefore, classified logs and annotated traces shall be sent directly to the Fleet Numerical Oceanography Center Monterey, CA 93943.
9. PROCUREMENT AND MAINTENANCE.
 - a. XBT Equipment. Commandant (G-TES) is responsible for the initial procurement of XBT systems. Routine maintenance of permanently installed XBTs is the responsibility of individual ships. Any maintenance problems which are beyond the capability of the ship's force should be referred to the appropriate MLC (tes-1). Additional support information is available in reference (d).

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9. a. (1) The XBT systems on Coast Guard cutters are Navy-supported. Commandant receives funding annually for system maintenance and distributes these funds to MLC commanders through the CG-4144 process, "Operating Guide Summary of Budget Estimates."
- (2) Norfolk Naval Shipyard, Portsmouth, VA has been designated as the primary source for SSQ series XBT system repair. Equipment requiring repair should be shipped with a DD-1149, "Requisition and Invoice/Shipping Document" to Code 966. Code 213 handles repairables. Before shipping equipment to the shipyard, make arrangements by phone (804)396- 7513.

Note: The MK2A XBT system, currently installed on Coast Guard cutters, is no longer in production. The U.S. Navy is in the process of procuring replacement systems for its fleet and the Coast Guard's. Commandant (G-TES) is the point of contact for replacement systems. Replacements are not expected soon, but a schedule will be promulgated when available. In the meantime, the existing system will be supported to the extent feasible.

b. Consumables.

- (1) AR-4 XBT chart paper (for use with T-4 probes) may be requisitioned from: Supply Center Brooklyn; Stock Number: 6655-00-162-2481; Part 212777-1; Unit of Issue: roll.
- (2) Probes should be ordered well in advance of anticipated usage. No stock number is necessary. For special cruises (see paragraph 4) XBT probes will be supplied by the sponsoring organization; or, arrangements may be made to draw probes from the cutter's current stock, with replacement to be made by the sponsoring organization at a later date. XBT probes for special projects may be purchased directly from the manufacturer: Sippican Ocean Systems, Inc., 7 Barnabas Road, Marion, MA 02738; (617) 748-1160. T-4 XBT probes may be obtained at no cost by letter or telephone request to:

Commanding Officer
Fleet Numerical Oceanography Center
Monterey, CA 93940
Telephone: (408) 647-4451

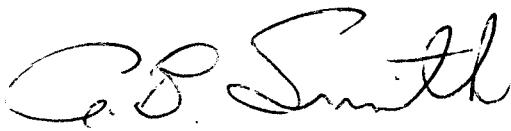
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10. ACTION.

- a. Area commanders and other operational commanders may promulgate additional instructions as deemed necessary to comply with special requirements for XBT data collection and reporting within their commands.
- b. Commanding Officers of all cutters equipped with XBT systems shall comply with the provisions of this instruction.
- c. Any problems of a technical nature should be addressed to Commander, International Ice Patrol (FTS 642-2626). Questions of a policy nature should be referred to Commandant (G-NIO) (FTS 267-1450).

11. FORMS AVAILABILITY. Additional Bathythermograph Log Sheets, NOAA-77-22 may be procured from Supply Center Brooklyn, using SN 7530-00-F02-1830.



A. B. Smith
Acting Chief, Office of
Navigation Safety &
Waterway Services

Encl: (1) Instructions for Preparing the Bathythermograph Log Sheet

COMPLETING THE BATHY THERMOGRAPH LOG SHEET

FOLLOW SAMPLE BATHY THERMOGRAPH LOG (see below) as guide for recording data.

I. REFERENCE INFORMATION

- A. On each Bathymeterograph Log sheet, record the following information:
1. PLATFORM TYPE (From Table 1)
 2. PLATFORM NAME (When observations are from aircraft, enter code word designator)
 3. PLATFORM DESIGNATOR (Hull Number)
 4. COUNTRY
 5. INSTITUTION (or monitoring activity)
 6. CRUISE NUMBER (or project number, when applicable)
 7. PROJECT (name of operation)

PLATFORM TYPE CODE	
1. Ship	5. Submersible/Submarine
2. Lightship	6. Aircraft
3. Buoy	7. Ice Island
4. Fixed Tower	8. Fixed Coastal Station

B. For each individual bathymeterograph (BATHY) observation, the following information is also recorded:

1. STATION NUMBER (when applicable).
2. OBSERVATION NUMBER (consecutive number). This number should correspond to that entered on the BT chart. For ships and aircraft, numbers should be consecutive from number "1" for the first observation after leaving the port or airfield and ending with the last observation of the cruise or flight.
3. INSTRUMENT (Type i.e., SXBT, AXBT, SSBT). Temperature profile taken with multihull measurement systems such as a CTD can also be recorded on this log sheet.
4. REMARKS (Incorporated in log sheet). Enter any comments concerning the BATHY observation under this section. Such remarks might include the following: High seas, coarse chart, improper wire unspooling, wire fouled on side of ship and wire break.

II. OPTIONAL ENVIRONMENTAL INFORMATION

Enter the following information as available:

1. DEPTH TO BOTTOM (METERS) - Enter ocean bottom depth to the nearest meter.
2. WIND (Speed)
3. Wind speed units indicator - Enter ".00" if wind speed in meters per second and ".1" if speed in knots.
4. True wind direction (D R) - Enter the true wind direction in tens of degrees, from which the wind is blowing. Enter ".00" for calm, ".36" for a direction of 336 to 004 degrees, etc.
5. AIR TEMP -WEATHER BULL (Sp/TTT)
6. AIR TEMP -WET BULL (Sp/TTT)
7. Air temperature sign indicator - Enter ".0" for positive temperatures and ".1" for negative temperatures.

Table 4 PERIOD OF SWELL					
Code	Average	Code	Average	Period in sec.	Figure
5	5 or less	0	10	10	
6	6	1	11		
7	7	2	12		
8	8	3	13		
9	> 9	4	14 or more		
		/	Calm or not determined		

b.	ENGLISH UNIT CODING (for use by Navy and Coast Guard units only).
c.	SURFACE READING
	Z ₀ ² ₀ Water surface ("00") is preprinted).
	T ₀ ² ₀ Enter the surface water temperature in °F to a tenth of a degree. When the temperature trace is unreadable in the first 30 feet, enter three silent lines (///) in these spaces.
d.	ENTER LAST DIGIT OF CURRENT CALENDAR
e.	ENTER TWO DIGIT NUMBER OF CURRENT MONTH IN SPACES 13-14. EXAMPLE: MAY IS 05.

B. AIRCRAFT. Navy aircraft, in addition to filling out the REFERENCE and RADIO INFORMATION SECTIONS, will fill in the FOR NAVY AIRCRAFT USE SECTION in the upper right corner of the log sheet, as follows:

3.4 Enter first two letters of squadron type in spaces 3A-3B. Example: VAW

Enter squadron number in spaces 6-7. Enter by zeros if less than 3 digits. (Exception: detachments enter "0".)

Enter numbers and/or letters assigned to identify, within a squadron, each sortie of such aircraft.

3.5 Enter last digit of current calendar year in space 12.

3.6 Enter two digit number of current month in spaces 13-14. Example: MAY IS 05.

C. SUBMARINES. Navy submarines will fill in the SURFACE DEPTH-TEMPERATURE group (with "00" preprinted in depth group 2-2), enter 800 in temperature group "1" to indicate submarine operations. The temperature profile begins with the next group.

D. RADIO MESSAGE INFORMATION action as follows:

In the Surface Depth-Temperature group (with "00" preprinted in depth group 2-2), enter 800 in temperature group "1" to indicate submarine operations. The temperature profile begins with the next group.

E. TEMPERATURE CONVERSION, Fahrenheit to Celsius

The 989NN group is a special coding instruction required before recording depths of 1000 feet, 2000 feet and each succeeding 1000-foot interval to termination. NN is coded as 01 for 1000 to 1989 feet; 02 for 2000 to 2989 feet, etc.

Death Group - For depths between 1000 and 2000 feet, 2000 and 3000 feet, etc. enter hundreds for end of flights only. Example for 1020 feet, record 02; for 1300 feet, record 30; for 1989 feet, record 99.

Temperature Group - Enter water temperature at depth 22 in °F to a tenth of a degree.

F. 22T₂T₂ GROUP but only if last group is an ocean bottom reading.

G. 22T₂T₂ GROUP but only if last group is an ocean bottom reading.

H. RADIO CALL

For ships, all messages must terminate with the ship radio call sign; for aircraft, use the "squawk" or "squid" designator or "ACFT".

I. INDICATOR GROUP (unclassified only) are to be transmitted to the following addresses:

OBS METEO WASHINGTON DC FLUNIOMEANCIEN MONTEREY CA USE NOAA Form 77-21 BATHY REPORT FOR RADIO TRANSMISSION

J. NAVY AND COAST GUARD. BATHY observations, classified or unclassified in accordance with ship/craft movement, are to be transmitted with PRIORITY precedence to the appropriate Address Indicator Group (AIG) below:

AIG 7608: For BATHY observations in the NORTH PACIFIC, SOUTH PACIFIC and INDIAN OCEANS, and their associated areas; all areas SOUTH of 60° SOUTH LATITUDE.

K. RECORDING THE RADIO MESSAGE INFORMATION (see SAMPLE BATHY THERMograph LOG and MESSAGE below). The procedure for entering the BATHY data are as follows:

1. Message Prefix Preprinted JXX identifies bathymeterograph observations. NOTE: ALL FOLLOWING SPACES MUST BE FILLED IN FOR RADIO TRANSMISSION IN 5 CHARACTERS.

2. DATE (YYMMDD)

YY Day Enter the day of month as numerals 01 through 31.

INFO: AF GWIC OFFUTT AFB NE

Enclosure (1) to COMDTINST 3142.1

Table 4 PERIOD OF SWELL					
Code	Average	Code	Average	Period in sec.	Figure
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C. SURFACE READING

Z₀²₀ Water surface ("00") is preprinted).

T₀²₀ Enter the surface water temperature in °F to a tenth of a degree. When the temperature trace is unreadable in the first 30 feet, enter three silent lines (///) in these spaces.

D. ENTER LAST DIGIT OF CURRENT CALENDAR

ENTER TWO DIGIT NUMBER OF CURRENT MONTH IN SPACES 13-14. EXAMPLE: MAY IS 05.

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2. DATE (YYMMDD)

YY Day Enter the day of month as numerals 01 through 31.

INFO: AF GWIC OFFUTT AFB NE

Enclosure (1) to COMDTINST 3142.1

DEPTH CONVERSION FEET TO METERS									
Feet	0	10	20	30	40	50	60	70	80
0	0	3	6	9	12	15	18	21	24
10	3	9	15	21	27	33	39	45	51
20	6	18	27	36	45	54	63	72	81
30	9	27	45	63	81	99	117	135	153
40	12	36	54	72	90	108	126	144	162
50	15	45	75	105	135	165	195	225	255
60	18	54	81	108	135	162	198	225	252
70	21	63	94.5	126	157.5	189	220.5	252	283.5
80	24	72	108	144	180	216	252	288	324
90	27	81	117	153	189	225	261	297	333
100	30	90	120	150	180	210	240	270	300
110	33	108	144	180	216	252	288	324	360
120	36	126	162	204	240	276	312	348	384
130	39	144	180	225	270	315	360	405	450
140	42	162	204	252	300	348	396	444	492
150	45	180	225	270	324	375	426	477	528
160	48	198	243	291	345	396	447	498	549
170	51	216	270	324	381	435	486	537	588
180	54	234	288	342	405	468	521	574	625
190	57	252	315	378	441	504	557	610	663
200	60	270	330	390	450	510	570	630	690
210	63	288	351	414	481	544	607	670	733
220	66	306	372	438	504	570	636	698	761
230	69	324	390	456	522	588	654	720	786
240	72	342	408	476	542	608	674	740	806
250	75	360	435	502	569	635	702	769	835
260	78	378	453	520	587	654	721	788	855
270	81	396	471	538	605	672	739	806	873
280	84	414	488	556	623	690	757	824	891
290	87	432	505	572	639	706	773	840	907
300	90	450	528	595	662	729	796	863	930
310	93	468	546	613	680	747	814	881	948
320	96	486	564	631	698	765	832	899	966
330	99	504	582	649	716	783	850	917	984
340	102	522	600	667	734	801	868	935	1002
350	105	540	618	685	752	819	886	953	1020
360	108	558	636	702	769	836	903	970	1037
370	111	576	654	720	787	854	921	988	1055
380	114	594	672	738	805	872	939	1006	1073
390	117	612	690	756	823	890	957	1024	1091
400	120	630	708	784	851	918	985	1052	1119
410	123	648	726	802	869	936	1003	1070	1137
420	126	666	744	820	887	954	1021	1088	1155
430	129	684	762	838	905	972	1039	1106	1173
440	132	702	780	856	923	990	1057	1124	1191
450	135	720	798	874	941	1008	1075	1142	1209
460	138	738	816	892	959	1026	1093	1160	1237
470	141	756	834	910	977	1044	1111	1178	1245
480	144	774	852	928	995	1062	1129	1196	1263
490	147	792	870	946	1012	1079	1146	1213	1280
500	150	810	888	964	1030	1097	1164	1231	1298

IV. ADDITIONAL NAVY INSTRUCTIONS

CODE	INSTRUMENT	DESCRIPTION
1	bucket thermometer	intake air temperature in condenser
2	steam ship, or hull of engine cooling system on motor ships.	steam ship, or hull of engine cooling system on motor ships.
3	trailing duct sensor	trailing duct sensor
4	hull contact sensor	hull contact sensor
5	"hull heat"	"hull heat"
6	radiation thermometer	radiation thermometer
7	heat sink thermometer	heat sink thermometer
8	other	other

Wave period (PERI)—Enter the average wind wave period in minutes. Enter "00" for calm, and "99" when the wind wave period cannot be determined because the sea is confused. When the wind wave period cannot be determined for any other reason, enter two slant lines (//).

BATHYTHERMOGRAPH LOG

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be
100-meter interval to termination.
100-meter interval as 01 for 100 to 198,
000 meters; as 01 for 200 to 299 meters,
etc.

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